

Serial No. 10/822,008

Amdt Dated: **December 8, 2004**

Docket No. P-0651

Reply to Office Action of September 8, 2004

### **REMARKS/ARGUMENTS**

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-20 are pending in the present application. Claims 1, 2 and 8-12 have been amended and claims 15-20 have been added by the present amendment.

In the outstanding office action, claims 1-17 were rejected under 35 U.S.C. § 102(b) as anticipated by Finman, and claims 1-4 and 7 were rejected under 35 U.S.C. § 102(b) as anticipated by Gu et al.

Claims 1-17 stand rejected under 35 U.S.C. § 102(b) as anticipated by Finman. This rejection is respectfully traversed.

Independent claims 1 and 8 have been amended to include some of the subject matter respectively recited in claims 2 and 9. For example, independent claim 1 is directed to an apparatus for calibrating a reception signal of an array antenna in a mobile communication system. The apparatus includes a reference signal generator which outputs a plurality of reference signals having the same phases, by calibrating a phase of a locally generated signal; and an antenna array which receives a radio signal through a plurality of antenna paths by a plurality of reference signals, and calibrating distortion of each array antenna path. Further, the reference signal generating unit includes a splitter which divides an RF signal into as many signals as a number of antennas in the array, a phase detector which detects phase

information of the divided signals, and a phase shifter which uniformly controls phases of the divided signals based on the phase information.

In an non-limiting example, Figure 2 illustrates a reference signal generator 100 and an antenna array 110. The reference signal generator 100 includes a splitter 103 which divides an RF signal into as many signals as a number of antennas in the array, a phase detector 104 which detects phase information of the divided signals, and a phase shifter 105 which uniformly controls phases of the divided signals based on the phase information such that the reference signal generator 100 outputs a plurality of reference signals having the same phases by calibrating a phase of the local generated signal 101.

As noted in the background of the related art of the present application, Figures 1A and 1B illustrate a calibration process in which a locally generated signal is used as a reference signal, and a splitter 20 is used to divide the signal. If an ideal splitter was used, the phases of the divided signals would be the same. However, an actual splitter is different from an ideal one, so that signals output from the splitter have sizes and phases which are different from each other. That is, when a signal output from the array 30 is measured after a signal has been input into the array 30 via the RF block 10 and splitter 20, inherent errors of the splitter and the array are mixed in the output signal, and thus the error of the array 30 cannot be calibrated (see paragraphs [13] and [14]). In order to properly calibrate the error of the array, the background art uses the configuration shown in Figure 1B (see also

paragraph [15]). However, the background method of using a local generated reference path is defective, because a complicated measuring process has to be performed twice to calibrate an error generator when a signal passes through splitter (see paragraph [17] and Figure 1B).

The present invention solves the problem of the background art by including the phase shifter 105 which receives the split signals from the splitter 103 and ensures that the phase of each signal output therefrom to the antenna array 110 are the same.

The Office Action indicates that Finman teaches this features and cites the reference signal generator 163 and states the generator 163 outputs a plurality of reference signals having the same phases, by calibrating a phase of a local generated signal. However, with respect to Figure 8b of Finman, for example, it can be seen that the signal generator 163 does not calibrate a phase based on a local generated signal. Rather, the signal generator 163 is the local generated signal. Finman does not teach or suggest the claimed splitter, phase detector and phase shifter which receives the signals from the splitter and uniformly controls phases of the divided signals based on the phase information from the phase detector such that the reference signal generator outputs a plurality of reference signals having the same phases. Further, Finman does not teach or suggest that the phases output to an antenna are the same phase.

Accordingly, it is respectfully submitted independent claims 1 and 8 and each of the claims depending therefrom patentably defines over Finman.

Claims 1-4 and 7 stand rejected under 35 U.S.C. § 102(b) as anticipated by Gu et al.

This rejection is respectfully traversed.

Similar arguments apply to Gu et al. as that discussed above with respect to Finman. That is, as shown in Figure 2A of Gu et al., there is only a signal reference signal generator 110 disclosed at inputs signals to the terminals 92. Gu et al. teach in column 4, lines 26-30 that the reference signal generator 110, having an output 112, is used to provide a reference signal to each of the terminals 92 in accordance with an "in-loop" calibration process. Gu et al. does not teach or suggest that the signals output from the reference signal generator 110 have the same phase. In addition, because Gu et al. does not teach or suggest the claimed splitter, phase detector and phase shifter, it is respectfully noted that the signals output from the reference signal generator at the terminals 92 would not have the same phase based on path losses, etc. The present invention solves this problem, by including the claimed splitter, phase detector and phase shifter.

Accordingly, it is respectfully submitted independent claim 1 and each of the claims depending therefrom also patentably define over Gu et al.

In addition, the specification, abstract and drawings have been amended to correct minor informalities. It is believed that no new matter has been added.

Further, new claims 15-20 have been added to set forth the invention in a varying scope, and Applicant submits the new claims are supported by the originally filed

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specification. It is respectfully submitted new claims 15-20 are allowable for similar reasons as discussed above.

### **CONCLUSION**

In view of the foregoing amendments and remarks, it is respectfully submitted that the application is in condition for allowance. If the Examiner believes that any additional changes would place the application in better condition for allowance, the Examiner is invited to contact the undersigned attorney, David A. Bilodeau, at the telephone number listed below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this, concurrent and future replies, including extension of time fees, to Deposit Account 16-0607 and please credit any excess fees to such deposit account.

Respectfully submitted,  
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**Date: December 8, 2004**

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**Amendments to the Drawings:**

The attached drawings includes changes to Figs. 2 and 3. Figs. 2 and 3 have been amended to correct minor informalities.

Attachment: Replacement Sheet  
Annotated Sheet Showing Changes

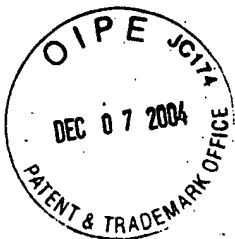


FIG. 2

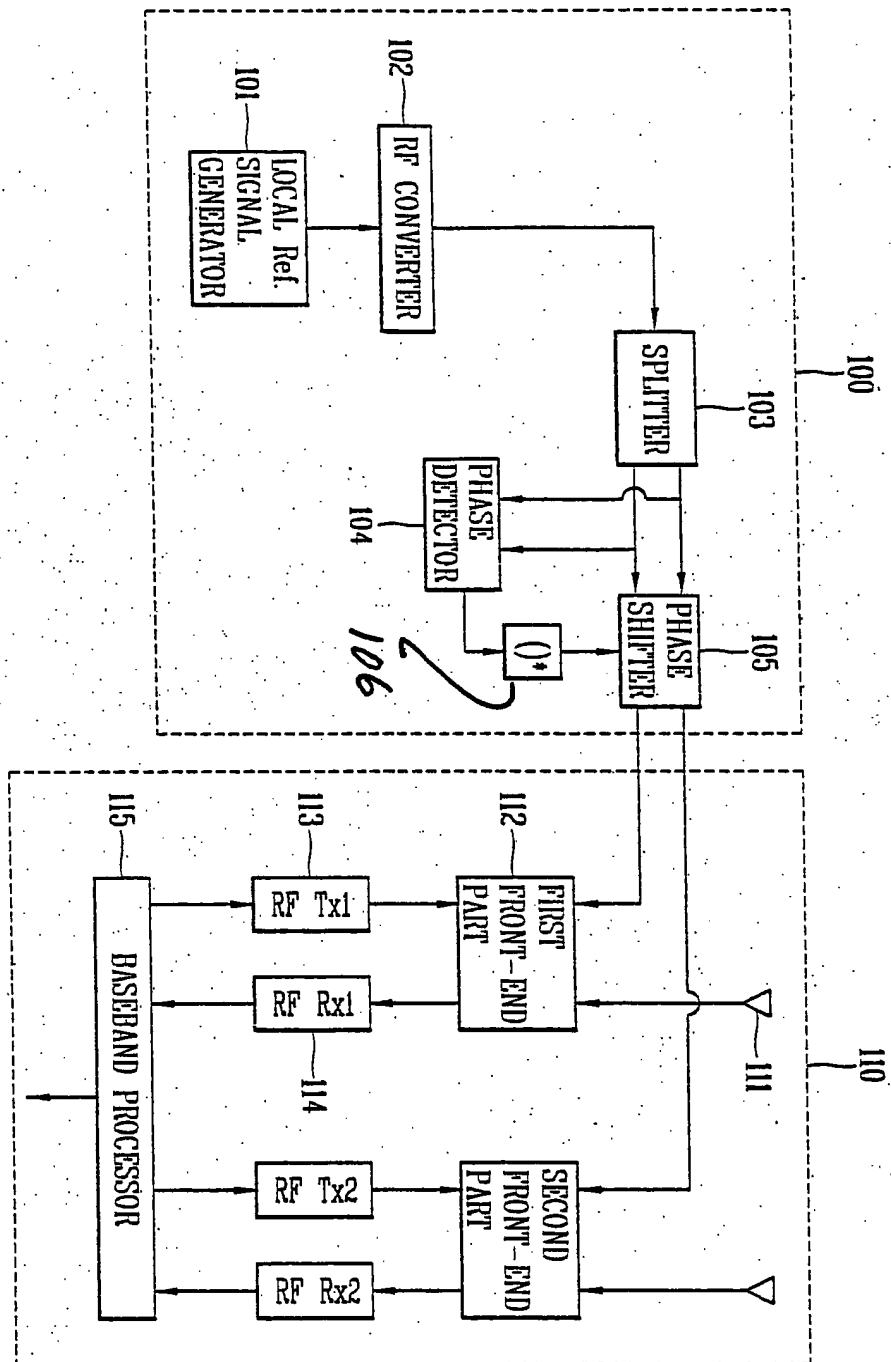




FIG. 3

